Natural Heritage & Endangered Species Program

Commonwealth of Massachusetts
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270

ENDANGERED SPECIES OF MASSACHUSETTS

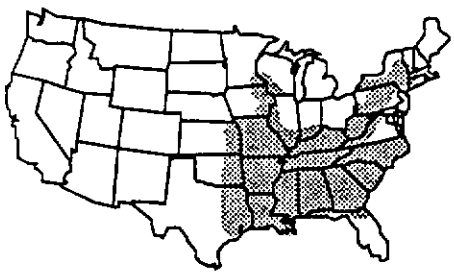
Timber Rattlesnake
(Crotalus horridus horridus)

DESCRIPTION: Rattlesnakes belong to the family of snakes known as pit vipers. Like other reptiles, they are vertebrates (they have backbones) and they are ectothermic (they cannot control their body heat by physiological means and must move to a warmer or cooler environment to control their body temperature). The term "pit viper" derives from the characteristic loreal pits. There is one pit on each side of the head, lying midway between the nostril and eye but below their level. Each pit contains sensitive nerve ends that react to radiant heat. The primary function of these sensory units is to assist the snake in detecting warm-blooded prey in darkness. The head of a pit viper is broad and triangular. The neck is comparatively thin relative to the body. The eyes have vertically elliptical (catlike) pupils. There are no movable eyelids or external ear openings. Sight is fairly keen within a limited range; moving objects are perceived more readily than stationary ones.

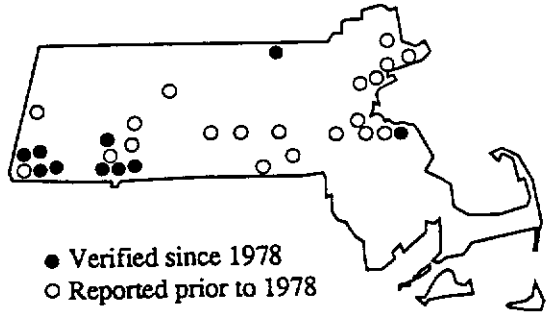
DeGraaf, Richard M. and Rudis, Deborah D. Amphibians and Reptiles of New England. Amherst, Massachusetts: The University of Massachusetts, 1983.

The Timber Rattlesnake is extremely sensitive to ground vibrations and can detect very slight ground disturbances. These vibrations are transmitted to the auditory nerve through the bones of the lower jaw. Its tongue is not a stinger but a very delicate organ associated with a pair of cavities, known as Jacobson's organ, located in the roof of the mouth. The tongue reaches out and brings in particles from the air. The Jacobson's organ appears to be directly related to the nasal system and aids in smelling; however, each system can be used independently as well as together.

This species has two well-developed and enlarged venom conducting fangs, located at the front of the mouth and secured to the upper jawbone. The fangs are movable and fold against the roof of the mouth when not in use. A fleshy sheath covers each fang when the mouth is closed. The fangs are not permanent; they are shed periodically.



Range of the Timber Rattlesnake



Distribution in Massachusetts

Each fang socket has several replacement fangs in various stages of development, located in the gum behind the functional fang. Before a fang is shed, a new one is already positioned. Each fang is connected internally to a venom gland. Through muscular action, venom is forced from the gland through a venom duct to the hollow fang and then into the victim. In addition to these enlarged fangs, pit vipers have many curved smaller teeth on the palate and lower jaw.

Color patterns in the Timber Rattlesnake are extremely variable; some individuals are almost jet black, while others are sulphur yellow with black, brown, or rust-colored blotches separated by crossbands on the back and sides. Southern populations have a chestnut stripe down the back. This species is distinguished from other North American species of rattlesnakes by a lack of stripes or bands on its head and face, and a solid black tail.

The Timber Rattlesnake, like all rattlesnakes, has a unique structure at the tip of its tail that, when vibrated, makes a rattle-like sound. Though the number of rattles, especially in free-ranging snakes, is variable there is usually at least one or two. A new rattle segment is added each time the rattlesnake sheds its skin. In natural situations, this occurs three or four times during the warmer months and is necessary for healthy growth. The approximate age of the snake can be determined only if the snake still has a prebutton with which it was born.

The Timber Rattlesnake has keeled scales (i.e.. a ridge protrudes from the middle of each scale) giving the snake a relatively rough-skinned appearance. The adult measures 90-152 cm (36-60 in) in length; the newborn young usually 20-41 cm (8-16 in). Males usually have longer tails, but there is no reliable external cue to differentiate the sexes.

SIMILAR SPECIES IN MASSACHUSETTS: There are only three Massachusetts snakes that have dorsal (back or upper side) blotches, saddles, or bands - The Timber Rattlesnake, the Northern Water Snake, and the Milk Snake - and they all have different venters (belly or under side). The Timber Rattlesnake is almost uniformly light below with just a little dark flecking; the Eastern Milk Snake (Lampropeltis triangulum) has a distinctive black and white checkerboard pattern; and the Northern Water Snake (Nerodia sipedon) has reddish and black crescents. Like the Timber Rattlesnake, the Milk Snake will vibrate its tail rapidly when disturbed and, among dry leaves, this can produce a rattling sound.

The Northern Copperhead (Agkistrodon contortrix) is the only other pit viper in Massachusetts, but it is more reddish brown with an hour-glass pattern on its body. Though it does have a facial pit, its head is narrower and less triangular. The dark phase of the Eastern Hognose Snake (Heterodon platyrhinos) superficially resembles the dark phase of the Timber Rattlesnake, but it has a fat head and a distinctive, sharply-upturned snout.

RANGE: The range of the Timber Rattlesnake is from southern New Hampshire, the Lake Champlain area to southwestern New York, west along the Ohio River Valley and north to the Mississippi River in Wisconsin. It extends to northern Texas, southern Illinois, northern Georgia and through the Appalachians to New Jersey. There are isolated colonies on Lake Erie Island, southern Ontario, southeastern New England, and north central North Carolina.

HABITAT IN MASSACHUSETTS: The Timber Rattlesnake prefers remote mountainous terrain characterized by second growth deciduous or coniferous forest, steep ledges and rock slides, and a high rodent population. In the ledges are fissures and crevices that, presumably, lead to subterranean caverns. It is believed that the rattlesnake hibernates in these deep caverns. The entrances to the hibernacula (den) have southern, southeastern, and southwestern exposures, allowing the rattlesnake to sun itself in the spring and fall. Scattered concentrations of large and small shelving rock slabs normally cap the top and surround the sides of rattlesnake dens.

Members of this species are sometimes found in pine barrens and wetlands near mountains, quarries, old stone walls, and abandoned buildings; may occasionally be found in fields and pastures. A supply of water is always nearby. A common feature of their habitat is remoteness; it seems that either they avoid areas frequented by people, or have been eliminated in densely populated areas.

LIFECYCLE/BEHAVIOR: In Massachusetts, the active season of the Timber Rattlesnake runs from mid-April to mid-October. Beginning in mid-April, the rattlesnake emerges from hibernation and begins basking on ledges during the day. It lingers in the area for several weeks. The Timber Rattlesnake can be found sunning itself regularly, often in the same spot, with other rattlesnakes or other species nearby. There is little movement or feeding early in the spring and the snakes often appear lethargic. The population is concentrated in and around the hibernaculum with some courtship and mating taking place.

Timber Rattlesnakes are known to mate both in the spring and autumn. Males seem to be particularly active during courtship and are able to track females by a pheromone the females leave behind. Courting males attempt to crawl along the length of the female and may engage in some chin rubbing. The pair may crawl over each other's bodies several times. If the female is ready to mate, she will lift the rear part of her body and tail off the ground slightly allowing the male to maneuver his tail around and under hers. The duration of actual mating is unknown.

After mating, most of the males and at least some of the females begin to migrate up to two or three miles from the den site. There is some question as to whether the snakes actually set up summer feeding territories or if they continually move in a large, oval route that brings them eventually back to the den site early in the fall. In the summer, female Timber Rattlesnakes appear to prefer open forest or edges of fields where temperatures are higher than in surrounding locations. Males, on the other hand, seem to linger in thicker woods where the forest canopy is more completely covered.

In northern latitudes and at the higher elevations where Timber Rattlesnakes are found, females give birth only every second or third year. Because gravid (pregnant) females generally fast for the summer and have little opportunity to eat in the autumn after giving birth, they may be under physical stress for some time and must use the next active season to restore their bodies.

The male and female Timber Rattlesnake reach sexual maturity at five months and six to seven months, respectively, with an estimated life span of 10-15 years. Breeding typically takes place in the spring but sometimes may occur in September or October. The gestation period is 4-5 months. The Timber Rattlesnake is ovoviviparous (their young are born alive). The birth process involves the female rattlesnake lifting her tail and the young are extruded, usually one at a time, within a minute or two of each other. Each snakeling is born enclosed in a membranous fetal sac. The young snake ruptures the sac using a tiny, sharp egg tooth situated just inside the mouth in front of the upper jaw. Five to nine young, measuring 20-25 cm (8-10 in) in length, are born sometime between late August and mid-September. The mother does not care for her young. Each of the young is equipped with venom, fangs, and a single, tiny rattle segment called a button. In addition, they are born with a supply of egg yolk in their abdominal cavities. The young, nourished by this egg yolk, grow rapidly during their first few weeks. The snakelings remain near each other for a week or two and then shed their skins. Following this, the young have a tendency to move away from where they were born.

Newborn rattlesnakes have a velvety texture, though their pattern is essentially the same as that of the adult. Some newborns have a rust-colored stripe extending from head to tail along the middle of the back. The body color as well as the head is generally dark or light grey. Because the snakelings are born in late summer, they must find suitable overwintering sites relatively quickly. Studies have shown that the newborn Timber Rattlesnakes are able to detect the odors left by their mother or siblings, and with no former knowledge of the distance and direction of a wintering den site, may actually follow a trail left by their mother to the wintering den.

The Timber Rattlesnake feeds almost entirely on warm-blooded rodents, such as mice, voles, squirrels, shrews, and chipmunks, although it occasionally eats birds. Like all snakes, this species swallows its food whole. Drinking water is also needed by this species. During the spring and in the autumn, the Timber Rattlesnake hunts mainly by day as night temperatures are too low for normal activity. As the weather warms in the early summer, the rattlesnake changes its diurnal hunting to nocturnal activity. This change has several advantages: the snake avoids the intense heat of the day, and the possibility of capturing prey is considerably better because rodents and amphibians are more active at night.

The typical hunting behavior of the Timber Rattlesnake consists of long periods of lying motionless, with intervals of prowling. The snake captures its prey by sitting quietly for some time and then ambushing its prey when it moves within striking distance. Timber Rattlesnakes attempting to feed in this manner coil their bodies next to a fallen log and rest their heads or chin on the edge. The prey is detected by sight, scent, and the sensory pit which can detect the heat radiating from a warm-blooded animal. Thus guided, the snake strikes out at its prey and sinks its venom-conducting fangs into the prey. Usually it then recoils and waits for the venom to overcome the victim. After a strike, the rattlesnake uses its sense of smell to track the victim. The length of time before the prey dies depends largely on the size and kind of prey and the amount of venom injected. The venom serves two important functions. In addition to being the killing agent, it contains enzymes that break down the victim's body tissue and aid in digestion.

The use of the venom as a defensive weapon is secondary. Their defensive actions are largely determined by the degree of intrusion and the accessibility of a refuge. As snake will resort to striking and biting only as a last resort - generally only when it has been cut off from retreat or when actually seized. Even when pushed to the limit, venomous snakes rarely use their poison to the fullest extent. The Timber Rattlesnake is not boldly aggressive. In the field, this species tends to be nervous and high-strung and will quickly seek shelter if approached. The last human fatality from a Timber Rattlesnake bite in Massachusetts was in 1791.

POPULATION STATUS IN MASSACHUSETTS: The Timber Rattlesnake is classified as an Endangered Species in Massachusetts because of its rarity and declining population. Historically, this species was widespread throughout the state, with 21 occurrences recorded in 22 locations. Since 1978, only 12 sightings in 10 locations have been documented. Destruction of rocky, wooded habitat, excessive removal by collectors, and mortality at the hands of snake hunters and the general public imperil the Timber Rattlesnake.

MANAGEMENT RECOMMENDATIONS: If it were not for the existence of public lands both on the state and national level (national and state parks, national forests, state forests) and of privately-owned nature preserves, much of the remaining habitat of the Timber Rattlesnake would have been destroyed. Thus, taking steps to increase public land holdings in prime Timber Rattlesnake habitats through a variety of purchase or conservation easement mechanisms is an important conservation strategy for this species. Individual rattlesnakes have been known to move as far as 7.2 km (4.5 mi) from their den and the maximum migratory distance averages 4.0 km (2.5 mi) for males. This data substantiates the need for 2.4 km (1.5 mi) of protected land in all directions from a den.

In addition to land protection, management recommendations to safeguard known populations would be as follows:

1. Protecting the snake at its known denning colonies through vigilance;
2. Fencing in special situations to limit access of private property by rattlesnakes;
3. Maintaining a level of secrecy regarding the localities of den sites; sightings should be reported to state Natural Heritage Programs;
4. Avoiding behavioral disturbance of the snakes by restricting access to dens and nursing areas;
5. Patrolling the area during vulnerable times, particularly (a) the spring emergence period and (b) the summer gestating and birthing periods;
6. Enhancing habitat by vegetation thinning or removing large trees at some den sites to prevent shading over and to maintain a somewhat open habitat ;
7. Develop methods of re-establishing populations at historic den sites;
8. Limiting logging within the summer range of a rattlesnake population to the winter months;
9. Educating the public with biologically accurate information and working with local residents to promote understanding of the Timber Rattlesnake as a beneficial native species of the deciduous forest community (Tyning, 1978).

Due to the location of preferred habitat, the denning sites are rarely effected by construction-type development but the Timber Rattlesnake is put at risk by construction and development nearby. Roads also place this species at risk due to mortality in crossing.

The Timber Rattlesnake is one of two species, (the other being the Northern Copperhead), that is affected by direct intentional persecution; they are killed out of deep rooted sociological fear. Too frequently, a Timber Rattlesnake coiled quietly in its natural habitat is a target of wanton killing and the snake has been heavily persecuted by bounty hunters and collectors for the live animal trade (Tyning, 1978). This species is currently listed as an "Endangered Species" in Massachusetts and is protected under law. Educating the public sector about the Timber Rattlesnake and the laws protecting it are critical to the long-term survival of the species. The most important means of protection for this species is law enforcement.

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